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Leveraging Systems Thinking as A Pedagogical Methodological Approach: The Impact of STEAM Curriculum Innovation, Quality, And Viability on Enhancing Student Outcomes

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Abstract

STEAM education is increasingly recognized for its ability to enhance student outcomes, yet its specific impact on achievement and employability competencies remains underexplored. Drawing upon and expanding Systems Thinking theory, this study aims to bridge this gap by examining the influence of STEAM curriculum design—focusing on innovation, quality, and viability—on students' skill development, with a particular emphasis on key employability competencies, namely, interpersonal skills and problem-solving abilities. It proposes a mediated-moderated model to explore the role of student engagement, particularly intellectual and procedural, as a critical mediating factor in the relationship between curriculum design and skill acquisition. Furthermore, the study investigates the moderating effects of teaching practices and students' digital literacy on this mechanism. Data will be collected from 700 Lebanese high school students using a validated questionnaire, supported by exploratory and confirmatory factor analyses to ensure reliability and dimensionality. Partial least squares structural equation modeling (PLS-SEM) will be performed. The anticipated findings suggest that curriculum design will directly enhances student engagement and skill development. Student engagement is expected to serve as a significant mediator in the relationship between curriculum design and student skill outcomes. Teaching practices and digital literacy are expected to amplify these effects, highlighting their importance in maximizing the potential of STEAM education. These insights will provide valuable guidance for educators and policymakers, emphasizing the need for innovative and well-rounded curricula to equip students with the competencies required in the modern workforce.

Keywords: STEAM; Systems Thinking; Student Engagement; Curriculum Design; Problem-Solving Skills